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SUPPLEMENT 175

SUMMARY OF COOPERATIVE TESTS OF COTTON SEED TREATMENTS -- 1947

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station Beltsville, Maryland

SUMMARY OF COOPERATIVE TESTS OF COTTON SEED TREATMENTS -- 1947

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This is a summary of the data on the survival of cotton seedlings in the regional cooperative plantings of 1947 and also of those from a special test that was planted in North Carolina and South Carolina in which Dow 9B and Seedox were compared at several dosages.

The treatments used were as follows:

1. Ceresan-M applied as dust at a rate of 3 gm./kg. of seed. This is designated as the dry treatment.

2. Slurry treatment. Ceresan-M was applied to fuzzy seed from a suspension that contained 2.3 lbs. per gal. of water at a rate of 46 cc. per 9 lbs. of seed. Calculations indicate that our rate of application was 3.13 gm./kg. seed. For application to reginned seed, 2.6 lbs. of Ceresan-M were added to 1 gal. of water; 46 cc. were added per 10 lbs. of seed which should have given a rate of application of 3.14 gm./kg. of seed.

3. Dow 9B. This dust contained 50 percent diluent and was applied at a rate of 3 gm./kg. in the regional test. This is the 3X dosage of the dosage test. The 2 gm. and 4 gm. per kg. dosages of the special test are indicated by 2X and 4X, respectively.

4. Dow 9B-Matted. Dow 9B was applied at a rate of 3 gm./kg., after which the seed were shipped to Midland, Michigan, for matting which 2 percent Methocel.

5. Dow 9B+Zerlate. Dow 9B was applied at a rate of 3 gm./kg., after which Zerlate was applied at a rate of 4 gm./kg. of seed.

6. Dow 9B+Spergon. Dow 9B was applied at a rate of 3 gm./kg., after which Spergon was applied at a rate of 4 gm./kg. of seed.

7. Seedox, a micronized dust containing 50 percent 2,4,5-trichlorophenyl acetate and 50 percent Pyrax ABB. The rates of application were 1 gm./kg. (1X), 2 gm./kg. (2X), 3 gm./kg. (3X).

Lots of Coker 100-WR seed naturally infested by Colletotrichum gossypii were used in the tests. The reginned and acid-delinted seed of the regional test were prepared from the same original lot. Relative to the mean for the fuzzy seeds, the mean weights of the reginned and delinted seeds were 92.4 percent and 84.3 percent, respectively. These relative weights, however, do not accurately indicate the mean loss of the individual seeds, since some trash and defective seeds were removed in both processes. The removal of defective seeds seems the logical explanation of the higher percentage of viable seeds in the reginned than in the fuzzy sub-lots of lot A of table 1. A similar difference was not apparent in the field plantings, table 2. Since the percentage of emergence of the delinted sub-lots is slightly below that of the corresponding fuzzy sub-lots, table 1, acid injury is suggested.

After treatment, seeds representative of most of the treated sub-lots were germinated in the laboratory in sand culture at 24°C. All treatments were about equally effective on fuzzy and reginned seeds, except the 1X dosage of Seedox. The 8 percent of seedlings for the fuzzy seed that were infected by the anthracnose fungus after treatment with Ceresan-M, suggests that an unusually large number of the viable seeds of this lot were internally infected by Colletotrichum gossypii. Since the emergence for the Ceresan-M treated fuzzy seed was greater than for Seedox and Dow 9B, there is a suggestion that these internally infected seeds did not develop into emerged seedlings when the seeds were treated by the latter two fungicides. The number of seeds germinated, 96, was not adequate to supply definite proof.

A brief consideration of the means for all plantings in the regional test, table 2, may be of some interest, although means of this type usually do not indicate the response to treatment in the plantings in which seed treatment gave the largest increases. The mean emergence for the three kinds of untreated seed is about the same, 36 to 38 percent. The best treatment for both fuzzy and reginned seed, as indicated by means of 59 and 55 percent, respectively, was the dry application of Ceresan-M. The slurry application gave slightly lower results by 4 and 3 percent, respectively, for both kinds of seed. The 2 gm./kg. dosage

Table 1. Results obtained when the two lots of cotton seed used in the plantings of 1947 were treated with Ceresan-M, Dow 9B, and Seedox; and the seeds were germinated in the laboratory in sand culture at 24°C. Data are based on the germination of 96 seeds.

Type of seed and Treatment	Lot A		Lot B	
	Emerged No.	Infected No.	Emerged No.	Infected No.
1. Fuzzy Seed				
a. Check	65	54	80	79
b. Ceresan-M	80	8	92	4
c. Dow 9B	71	0	84	4
d. Seedox-1X			85	17
e. Seedox-2X	74	6	91	1
f. Seedox-3X			84	3
2. Reginned Seed				
a. Check	84	77	80	30
b. Ceresan-M	80	1	83	0
c. Dow 9B	74	0	81	6
d. Seedox-1X			77	9
e. Seedox-2X	73	1	78	0
f. Seedox-3X			73	0
3. Delinted Seed				
a. Check	60	4	91	4
b. Ceresan-M	64	0	89	0
c. Dow 9B	65	0	87	0
d. Seedox-2X	68	1	86	0

of Seedox was the second in rank on fuzzy seed, but was 3 percent inferior to Dow 9B on reginned. The combination of matting with Dow 9B gave erratic results on both fuzzy and reginned seed; and on fuzzy seed the mean number of seedlings for the matted seed was 4 percent less than for the sub-lot treated with Dow 9B. The fuzzy matted seed gave especially poor results in the SC2 planting in which it was significantly lower than all other treatments of fuzzy seed, inclusive of the untreated. In this planting emergence was delayed by a lack of adequate soil moisture. Most of the other treatments gave a lower percentage of seedlings in the Tx2 planting than the dry treatment with Ceresan-M. These differences were associated with delayed seedling emergence as a result of frequent rains and low temperatures after planting--a mean of 15°C. for the first two weeks. Cotton seedlings grown in this soil from this field in the laboratory were copiously infected by Rhizoctonia solani.

Table 2. Cotton seed treatment -- 1947. Regional test. Data indicate the percentage of surviving seedlings at final seedling count as percent of seeds planted. (Concluded on opposite page)

	Locations									
	Ark1	Ark2	Al	Gal	Ga2	Lal	La2	Ms	NC1	NC2	NC3
LSD-1%	13	9.3	9.4	16	8.2	19	12	8.5	8.6	8.7	7.1
Kind of Seed											
A. Fuzzy											
Check	34	25	35	37	67	31	21	58	25	42	34
Ceresan-M											
Dry	41	42	60	55	75	64	59	70	50	66	52
Slurry	48	41	55	57	75	50	50	70	49	62	50
Dow 9B											
Regular	36	37	55	50	70	41	48	72	42	63	46
Matted	35	38	50	43	68	36	52	64	49	65	46
+Zerlate				50	70	57	42	65	41	63	48
+Spergon				43	73	57	45		39	59	46
Seedox 1X				48	72				44	64	51
Seedox 2X	47	47	56	55	76	54	46	73	43	63	48
B. Reginned											
Check	27	24	36	38	62	43	28	62	26	38	34
Ceresan-M											
Dry	49	46	50	50	67	45	50	72	47	68	52
Slurry	46	45	49	51	68	42	56	70	42	61	53
Dow 9B											
Regular	35	39	51	45	73	56	38	70	39	63	47
Matted	32	43	44	37	78	50	41	62	39	64	49
+Zerlate				46	71	58	46	63	44	60	49
+Spergon				48	70	57	41		41	60	48
Seedox 1X				43	73						
Seedox 2X	32	37	47	49	73	45	45	58	41	62	46
C. Delinted											
Check	27	28	42	23	42	35	18	52	34	45	43
Ceresan-M	24	34	54	48	66	48	55	60	47	61	55
Dow 9B						44	51		40	58	51
Seedox						55	48				

Data for the untreated seed were not included in the analyses from which LSD's (1 percent level) were derived. The inclusion of the checks in most instances would have changed the values only slightly.

Table 2 cont.

	Locations									
	Ok1	Ok2	SC1	SC2	SC3	Tn1	Tn2	Tx1	Tx2	Mx
LSD-1%	5.3	8.5	12	16	13	11	14	9	12	
Kind of Seed										
A. Fuzzy										
Check	56	77	40	39	31	34	10	18	47	38
Ceresan-M										
Dry	71	73	56	62	46	67	47	46	62	58
Slurry	71	77	59	57	43	61	38	37	47	55
Dow 9B										
Regular	66	75	58	44	48	61	46	39	53	53
Matted	56	78	62	19	37	56	40	33	52	49
+Zerlate			54	47						
+Spergon			64	46						
Seedox 1X										
Seedox 2X	66	75	64	59	45	63	43	34	56	56
B. Reginned										
Check	64	76	37	27	35	34	13	16	37	38
Ceresan-M										
Dry	70	83	57	46	51	60	43	38	54	55
Slurry	74	79	56	51	50	52	39	31	50	53
Dow 9B										
Regular	75	80	56	38	49	60	30	35	52	52
Matted	64	79	59	49	41	56	42	39	49	50
+Zerlate			58	45						
+Spergon			56	46						
Seedox 1X										
Seedox 2X	56	75	45	38	44	58	40	26	53	48
C. Delinted										
Check	44	75	41	32	37	39	13	17	42	36
Ceresan-M	64	76	45	39	58	50	32	27	51	50
Dow 9B			58	36				26	57	
Seedox			54	44				27	52	

Table 3. Cotton seed treatment -- 1947. Special dosage test to compare Ceresan-M, Dow 9B, and Seedox. Data indicate the percentage of surviving seedlings at final seedling count as percent of seeds planted.

	SC-1A	SC-1B	SC-2	NC-1A	NC-1B	NC2	Mx
LSD-1%	17	15	12	6.7	5.2	5.9	
Treatments g./kg							
Fuzzy Seed							
Check	28	42	50	39	44	66	45
Ceresan -M, 3g./kg	61	71	68	69	71	84	71
Dow 9B							
2X, 2g./kg.	61	71	62	68	69	78	68
3X, 3g./kg.	64	73	63	65	70	78	69
4X, 4g./kg.	71	70	66	64	68	76	69
Seedox							
1X, 1 g./kg.	55	73	58	59	68	77	65
2X, 2 g./kg.	67	76	67	66	71	86	72
3X, 3 g./kg.	70	72	60	66	72	80	70
Reginned Seed							
Check	31	48	39	32	49	48	41
Ceresan-M, 3 g./kg.	60	68	58	52	65	80	64
Dow 9B							
2X, 2 g./kg.	55	64	49	47	59	71	58
3X, 3 g./kg.	47	68	54	50	58	71	58
4X, 4 g./kg.	52	62	51	49	55	71	57
Seedox							
1X, 1 g/kg.	43	61	46	46	61	69	54
2X, 2 g/kg.	55	60	50	47	58	68	56
3X, 3g/kg.	48	67	43	51	56	72	56
Delinted Seed							
Check	66	62	44				
Ceresan-M, 3 g./kg.	81	77	60				
Dow 9B, 3 g/kg.	78	74	56				
Seedox, 2 g/kg.	78	75	54				

In addition to the above, there were 8 instances for the fuzzy sub-lots in which the dry application of Ceresan-M was superior to the other treatments; viz., over matted in Ark1, La1, and Ok1, SC2, and Tx1; over the Dow 9B+Zerlate and the Dow 9B+Spergon combinations in NC1; over Seedox in Tx1 and over Ceresan-M applied by the slurry method in Tx2. The slurry treatment was also significantly better than Dow 9B-matted in Ok1.

The number of significant differences among the reginned sub-lots was greater than among the fuzzy sub-lots. The dry application of Ceresan was significantly higher than: (a) Seedox in the Ark1, Miss, Ok1, and Tx1 plantings; (b) Dow 9B in Ark1, and La2; (c) Dow 9B-matted in Ark1, Miss, and Ok1; (d) Dow 9B+Zerlate in Miss. Similarly, the slurry application was significantly better than: (a) Seedox in Ark1, Miss, and Ok1; (b) matted in Ark1 and Ok1; (c) Dow 9B and Dow 9B+Spergon in La2. There were also 3 instances in which Seedox was inferior to Dow 9B treatments; viz., Dow 9B in Ok1, Dow 9B+Zerlate in SC1, and Dow 9B-matted in Tx1.

There is no evidence to indicate any merit for the use of the slurry method in applying Ceresan-M to cotton seed, except for the reduction of the poisoning hazard. On fuzzy seed, it gave inferior emergence as compared to the dust application in the La1, La2, Tn1, Tn2, Tx1, and Tx2 plantings. The differences between the two methods of application was smallest for reginned seed. The slurry application was low on fuzzy seed in the NC2, Tn1, Tx1, and Tx2 plantings.

In North Carolina and South Carolina, a special test, table 3, was planted, in which the 3 gm./kg. dosage of Ceresan-M was compared with 3 dosages of Seedox and Dow 9B on fuzzy and reginned seed, and at one dosage on delinted seed (in South Carolina only). All treatments were about equally effective on fuzzy seed, although the 1X dosage of Seedox was low in SC1A. This and the high percentage of seedlings infected by C. gossypii in the laboratory test (table 1) would indicate that 1 gm./kg. is not an effective dosage of Seedox under conditions favorable for seedling infection by tha anthracnose fungus.

The emergence of the reginned seed in the field was about 10 percent less than that of the fuzzy in both the laboratory and field tests. Whether this represents a real effect for reginning is uncertain, since the bags of seed from which these two kinds of seed were derived were not mixed before reginning. They did, however, come from a larger lot of seed that was derived from the same picking of seed cotton from the same field. On reginned seed, Ceresan also tended to be a more effective treatment than the chlorinated organics, but was significantly better only in NC2. The latter compounds gave erratic results insofar as the effectiveness of the 3 dosages is concerned. The data would seem to favor the 3 gm. dosage of both Seedox and Dow 9B. All 3 fungicides were about equally effective on delinted seed.

Yields are available for 3 plantings of the regional rest and 3 of the special dosage test. There were no significant differences in the dosage test planting, SC1A, SC1B, and SC2. In the SC2 planting of the regional test, the yield for Dow 9B-matted seed was significantly lower than the yields for the other treatments and also for the mean yield of the planting. The smaller number of plants per 50-ft. row for this treatment as compared to some of the other treatments suggests that the small number of plants was not the only factor responsible for the low yields, since rows with a comparable number of plants in rows planted to seeds with another treatment produced much larger yields.

In the Tx1 planting, the seed treated with the slurry Ceresan-M was the only sub-lot of seed to give a significantly higher yield than another sub-lot; and its yield was significantly higher than those for the untreated sub-lots of fuzzy, reginned, and delinted seed.

The results for the 1947 plantings may be summarized briefly as follows: Treatment of the seed with Ceresan-M generally results in a slightly greater number of seedlings than did treatment with Seedox or Dow 9B. Dow 9B and Seedox gave comparable results. However, since no fungicide was consistently better than the other two and few differences among them were significant and large enough to be reflected in yields, superiority for none of the three chemicals has been demonstrated for all kinds of cotton seed under all field conditions.

COTTON SEEDLING DISEASE COMMITTEE